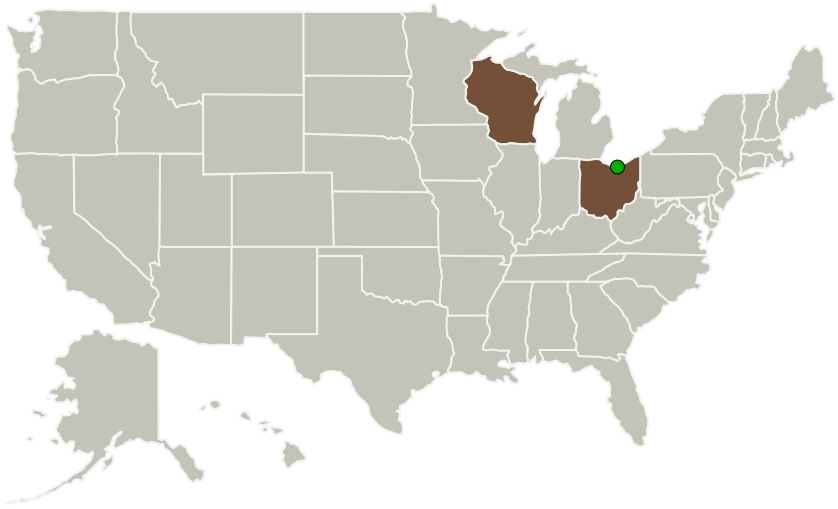
Pulsating Heat Pipe for Cryogenic Fluid Management, Phase I

Completed Technology Project (2015 - 2015)

Project Introduction

A passive Pulsating Heat Pipe (PHP) system is proposed to distribute cooling over broad areas with low additional system mass. The PHP technology takes advantage of the large latent heat associated with phase change of a working fluid that is confined to small capillaries to carry heat efficiently from evaporator regions to a condenser that is attached to the cold head of the cryocooler. This system will have an advantage over other distributed cooling approaches because it will be modular and can interface with any cooler that provides the required cooling power at the load temperature. The cooler may be a Stirling cooler, Pulse Tube cooler, reverse-Brayton cooler, Joule Thompson cooler, or some hybrid combination of these. Because the fluid flow is driven by fluid phase change caused by a temperature difference between the evaporators and the condenser, the loop is self-regulating. Flow is induced only when there is a thermal load. Also, because surface tension forces are dominant in the small capillaries of the PHP, this technology is suited for use in microgravity.

Primary U.S. Work Locations and Key Partners



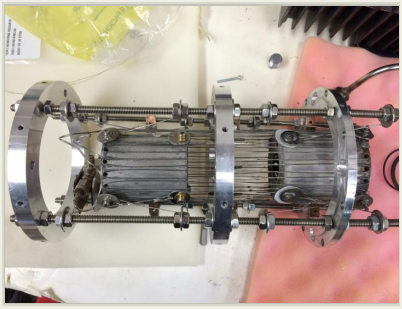


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Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Madison CryoGroup, LLC	Lead Organization	Industry	Middleton, Wisconsin
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Wisconsin

Project Transitions

June 2015: Project Start

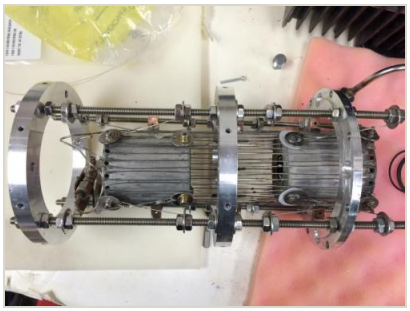
December 2015: Closed out

Closeout Summary: Pulsating Heat Pipe for Cryogenic Fluid Management, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/139242)*

Images



Briefing Chart Image
Pulsating Heat Pipe for Cryogenic Fluid Management, Phase I
(https://techport.nasa.gov/image/125984)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Madison CryoGroup, LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

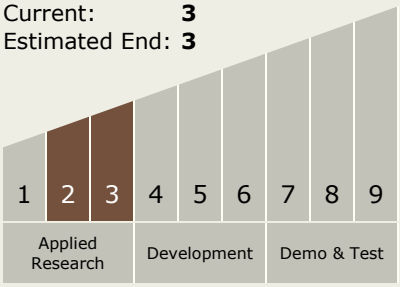
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
James Maddocks

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.1 Cryogenic Systems
    - TX14.1.3 Thermal Conditioning for Sensors, Instruments, and High Efficiency Electric Motors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System